

IBM

Research
Triangle
Park

North
Carolina







“Nothin’ could be finah...”

If ever there was a place where east truly meets west, North Carolina would have to be a prime candidate.

On the Tar Heel State’s 300-mile long shore lie the magnificent Outer Banks, a national seashore, and a never-ending series of history lessons: Manteo, the site of England’s abortive attempt to colonize America; Kitty Hawk, where two bicycle makers from Ohio first achieved man’s dream of powered flight; and Cape Hatteras, the once-feared “Graveyard of the Atlantic” which has seen over 2,000 ships disappear beneath the waves.

In the west, the Blue Ridge and Great Smoky mountain ranges join forces to provide the visitor with a visual spectacular impossible to forget: Mount Mitchell, at over 6,000 feet the highest point in the eastern United States; Cherokee, the Indian settlement pivotal

in the history of this native American; and Grandfather Mountain, a rugged piece of rock formed over a billion years ago.

Nestled between these opposing geographic entities is an area called the Piedmont, an admixture of rural farm and tobacco land and vibrant, growing urban areas with such names as Raleigh, Durham, Greensboro and Winston-Salem.

Yet, even in the cities are reminders that time, like the land, is preserved here, for it’s not unusual to walk out of a modern steel-and-concrete skyscraper only to discover a perfectly-restored ante-bellum mansion several blocks away.

This, then, is North Carolina — a land of history and paradox, a land of three distinct geographic regions, nuances of time, and a thousand-and-one indicators that today, like tomorrow, has its roots planted firmly in the past.

“Nothin’ could be finah than

to be in Carolina,” goes the song. And those of us who work, live and play here couldn’t agree more.

For the great outdoors, it’s a natural.

If outdoor recreation is how you most like to spend your free time, North Carolina will accommodate your every whim.

Golf, for example, is accurately called “the state sport,” with internationally-renowned Pinehurst and Southern Pines just a short 1-1/2 hour drive from Raleigh. The area is both a golfer’s delight and a shopper’s dream, with quaint businesses lining narrow village streets. Likewise, Pinehurst is the home of the Golf Hall of Fame, and it hosts the Hall of Fame classic on its famed Number Two Course.

Water sports can be, and are, enjoyed across the state from the



cool waters of mountain lakes to the briny chop of the Atlantic surf up and down North Carolina's historic coastline. And fishing? It's everywhere with everything from trout to marlin.

If you like to snow ski, you can't go any farther south and do it because North Carolina is the southernmost skiing region in the United States, claiming such inviting resorts as Sugar Mountain, Seven Devils and Hound Ears as its very own.

Outdoor drama is a favorite evening entertainment during the summer months. If you're vacationing in the mountains, "Unto These Hills" in Cherokee and "Horn In The West" in Boone should be on your "must see" list. And if the beach beckons you, Paul Green's long-running "The Lost Colony" is an extravaganza you'll probably take in more than once.

In short, if you like the out-of-doors, the Tar Heel State's temperate climate will allow you to enjoy it.

The Research Triangle Park — center of culture and education.

In the heart of North Carolina's Research Triangle lies the Research Triangle Park, a 5,400-

acre development shared by area universities and businesses.

In the park are numerous government facilities including: the Environmental Protection Agency, the National Center for Health Statistics, and the National Center for the Humanities.

Sharing the bountiful space of the park are private businesses such as Burroughs-Wellcome, Northrop and, of course, IBM.

The park is linked to both Raleigh and Durham by Interstate 40, a modern highway that makes commuting simply a matter of minutes.



The Research Triangle gets its name from North Carolina State University, the University of North Carolina and Duke University, all three of which form the cornerstones for this vibrant area.

North Carolina State University is located in the capital city of Raleigh, and it is North Carolina's land-grant institution. Other institutions of higher learning in the

Raleigh area include Meredith College, Shaw University and St. Augustine's University.

The University of North Carolina — in the quaint village of Chapel Hill — is the nation's oldest state university.

Duke University in Durham has a number of qualities to boast about, but its acclaim as an institution of higher learning stems mostly from its excellent School of Medicine and Hospital. Another institution of note, North Carolina Central University, is also located in Durham.

RTP, conveniently located between two great cities

Raleigh is the capital of North Carolina and the seat of state government. An All-American city, Raleigh is the home of the state's internationally-known Museum of Art, the annual State Fair and the nuclear reactor laboratory on the campus of North Carolina State University.

A city blessed with oaks, maples, pines and azaleas, Raleigh also proudly displays the Capitol Building (an excellent example of Grecian Doric architecture) and the Governor's Mansion, perhaps one of the finest Victorian homes in the nation.



Our Research Triangle Park site, by the way, is located 19 miles from Raleigh and 10 miles from Durham.

The city of Durham, known by many as the tobacco city, is the home of Liggett and Myers, Inc., as well as the American Tobacco Company.

Durham is host to the North Carolina Museum of Life and Science, a well-equipped children's museum which features pre-historic exhibits, a nature library, a zoo and an aviary.

Duke University and North Carolina Central University are located just five minutes from Durham's busy business district.

The American Dance Festival — a world-class event — takes up residence each year in Durham.

IBM, Research Triangle Park... a major part of the Communication Products Division.

When IBM announced plans for a facility in the Research Triangle Park in 1965, those plans called for a four-building complex that occupied 605,000 square feet of space.

Today, that conservative set of statistics has become a part of IBM's history, and our Research Triangle Park site now occupies 3 million square feet of space.

A part of the Communication Products Division, we have a tripartite mission:

- to develop and manufacture CPD products and systems
- to provide required programming and systems architecture
- and to provide technological subassemblies for communication products.

The principle products developed and manufactured by the industry group here are the retail and supermarket systems while the most successful product family manufactured here is the 3270.

IBM's Data Processing and Field Engineering Divisions also maintain several centers here to support branch office marketing and installation activities for communications systems.

A primary center for the development and manufacture of IBM communications systems, terminal products and programs, IBM at the Research Triangle Park plays an increasingly important role in the gathering and dissemination of information in a time correctly labeled "the computer age."

DIS provides interactive, graphics, and batch computer services which meet the needs of the programming and engineering development organizations at IBM Raleigh. DIS consists of three different areas:

- **Systems Engineering**

This group includes system programmers who install, update and maintain the software for the local operating systems used by the development organizations. Data management and performance analysis for these systems is also provided by this group.

- **Plans and Controls**

This group provides long-range planning and financial controls for the services that DIS provides.

- **DP Operations and Network Services**

This group includes the DP Operations group and the network services group and provides teleprocessing expertise to the site.





Communications and Community Relations gathers and disseminates information internally to all IBM employees, externally to local and national publications and professional societies, and provides a link between IBM Raleigh and the local community.

Siteline

Siteline is the IBM Raleigh employee newspaper. A monthly publication, Siteline brings the employee news about company business, local news and news about other employees.

Bulletin Boards

Perhaps the most widely used vehicle for informing employees is IBM's bulletin board program, which carries such items as "Today"

bulletins; Corporate Bulletins; Promotions; and IBM Club News.

Speak Up!

Communications and Community Relations handles the IBM Speak Up! program, a program designed to provide a confidential channel through which employee complaints and questions can be answered by top management.

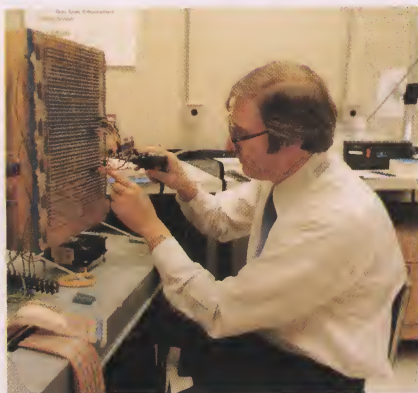
Fund for Community Service

Supplementary funds are administered by Communications and Community Relations to worthwhile community projects in which an employee is actively involved. Examples of organizations eligible for assistance through the Fund are theater and music organizations, rescue squads and hospitals.





The technology disciplines include computer and terminal interconnection; information routing and flow control; block, circuit, and hybrid mode communication system elements; networking and control of data, voice, and hybrid communication nodes; digital signal processors and algorithms; advanced communications applications; satellite communications systems; optical transmission applications; and magnetic device technology. The mission ranges from applied research through simulation, evaluation, and test operation of proposed systems.





Changing customer requirements creates a continuing demand for newer, more advanced products. As the requirements for a new product are defined, they are presented to an engineering team for development.

Development Engineering

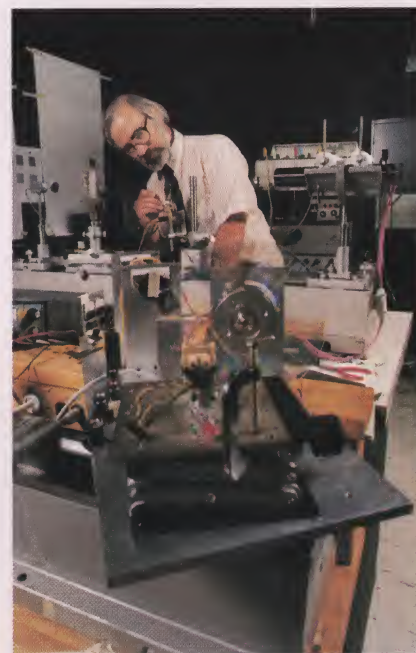
The Development Engineering team conceives the specifications and initial design for the new product based on currently available technologies and requirements for advances in technologies. Electrical engineers, mechanical engineers and programmers work together in a dynamic atmosphere to develop the detailed design for the new product. The latest automated design techniques and simulation tools are used to assure design integrity.

Product Engineering

The Product Engineering team continually improves products currently in production. Their design work improves product performance and usefulness and reduces cost. In addition, they design modifications to standard products to satisfy unique customer requirements.

Working here at the forefront of technology, electrical and mechanical engineers design and develop every aspect of a product from the latest in microprocessor and microelectronics design and packaging through the completed system. This includes such things as: digital and analog circuits, power systems, LSI and VLSI components, fiber optics, computer controlled instrumentation, high volume mechanism designs, laser and holographic technologies, processor devices, printing mechanisms, motion control devices, communications and telecommunications devices and servomechanism control systems.

Programmers in Raleigh are involved in every aspect of software design. This includes: system architecture, microcoding, performance evaluation, applications coding, emulators, operating systems, multiprocessing and multiprogramming, error detection, isolation, and recovery, system stresstesting, telecommunications, program simulators, network management, data base management, input/output device support and optimization and 'user-friendly' interface designs.





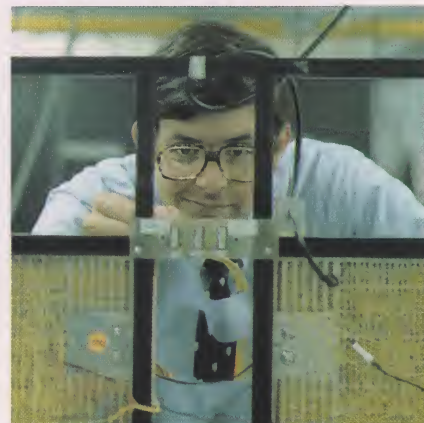
Printer Development in the IBM Raleigh Laboratory develops a broad spectrum of printers for worldwide applications. A multiplicity of printer technologies are pursued; matrix, band and non-impact. Performance of these technologies ranges from 60 characters per second to 750 lines per minute, and printed output varies from single-colored alphanumeric characters to multicolored business graphics and mathematical diagrams.

Starting its work during the initial planning and feasibility studies for a product, Printer Development applies electronic and mechanical technologies throughout the development and production of the printer and then assists with its maintenance after it has been shipped to customers worldwide. Development activities include analysis of printer attachment to host systems, design of operator panels, and design and analysis of specialized microprogram-to-electromechanical interfaces.

To accomplish that work, Printer Development employs professionals in various disciplines:

- Electrical engineers use computer-assisted techniques in designing logic and electrical circuitry, test systems, and simulation tests.
- Mechanical engineers design the mechanisms and package, as well as analyze electromechanical print mechanisms. They use the latest computer aided design programs in analyzing overall mechanical layout, component wear, mechanical stress, and acoustics.
- Microprogrammers design control programs to manipulate electromechanical print mechanisms and provide interfaces to host processors and computers. They also assist the engineers and planners in defining interfaces and supporting the product throughout test and installation in the customer's office.

Our engineers and microprogrammers participate in special printer programs in advanced technology and advanced printer development. They conduct laboratory experiments to analyze and evaluate the electromechanical devices under various operating conditions that affect the performance and reliability of printers.





Manufacturing Engineering is the direct technical link between development and manufacturing.

The development engineer works by functional specifications that spell out the customer's requirements. The manufacturing engineer looks at the same requirements in terms of how the product can be fabricated at the highest quality for the lowest price. To achieve this objective, the M.E. is responsible for defining and implementing required processes.

Manufacturing Engineering at Raleigh supports all laboratories, and it is one of only two manufacturing engineering groups in Raleigh.

Raleigh's manufacturing engineers come from broad backgrounds, including programming, electro-mechanical engineering, plastics and test engineering.

This important aspect of Raleigh's activities interacts with purchasing, quality audit, production control, and finance.



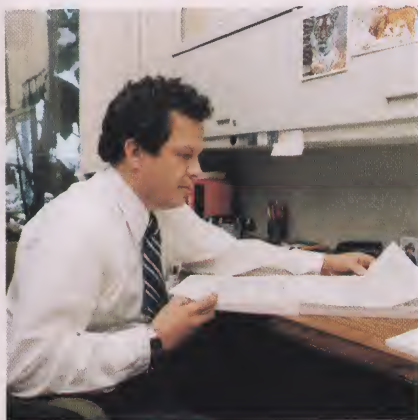


The Programming Center develops software for future host communication systems and IBM's communications equipment including terminals, control units, and office systems.

The Communications field is one of the fastest growing fields in software development, and, in that regard, optimum utilization of system resources is an ongoing requirement for the Raleigh systems programmer. Further, memory and processor utilization, priority scheduling, multi-tasking, integrity, recovery, and reliability are foremost design requirements the systems programmer must consider.

Additionally, the programmer must consider design challenges associated with a teleprocessing network: the variables of different teleprocessing devices, fluctuations in message arrival times, data security, and numerous other concerns. The requirement to provide easy to use customer and system programmer interfaces is a major consideration as programs supporting the automated office are developed.

Team programming, following structured programming techniques, is practiced at the Center. Further, automation is present in all development activities as maximum computer resources are made available to the programmer during the design, implementation and test phases of his or her work.





The Controller insures sound site financial controls, including formulating financial plans, policies and procedures and establishing effective measurements and reporting channels. To fulfill his mission, the Controller has the following areas coordinate these activities:

Accounting Services and Controls

Accounting Services provides the official financial records for the site. Included in this activity are cash control, the payment of IBM's suppliers, the control of fixed assets, and payroll.

Financial Planning

Financial Planning prepares and publishes the Raleigh Manufacturing and Development Operating and Strategic Plans, documents which spell out the financial plans for the site as well as the resources and constraints required to achieve these plans.

Financial Planning also monitors progress against these plans on a monthly basis and conducts reviews with Site Executives. Key elements of the Plan are production volumes, expense levels, product cost, manpower levels, cash plan, capital plan, and overhead structure.

Cost Accounting

Cost Accounting develops costs for all manufacturing parts, assemblies and machines. In conjunction with Financial Planning, Cost Accounting measures this activity and reports monthly to management. Key measurements include inventory levels, as well as the comparison of plan cost to actual cost.

Business Controls

Business Controls has the staff responsibility to assure that line management adheres to sound financial control practices. Therefore, line managers, with the assistance of Business Controls, develop self-tests which enable them to monitor and evaluate their control postures.





Quality Engineers have product quality responsibility beginning in the development stage, throughout manufacturing, and continuing through customer application. Quality Engineers assure overall customer satisfaction of a product by influencing design for reliability, establishing manufacturing quality levels, and controlling shipment quality through comprehensive audit plans.

The Quality Engineer formulates the total Quality Assurance Plan. This consists of developing sampling plans, manufacturing process audits, and test procedures. The Quality Engineer is the catalyst in coordinating efforts to establish and refine a sound Manufacturing Plan. Product Quality is further enhanced by in-depth evaluations of finished products in the Quality Laboratory to insure the functional integrity of the machines and verify overall reliability.

Quality Engineers work closely with IBM suppliers to assure conformance to IBM requirements. Quality Assurance is responsible for the quality of all vendor products including materials and processes required in fabricating parts and sub-assemblies.

The Field Product Performance Reporting System enables the Quality Engineer to monitor, analyze, and report on customer experience. This assures that customer concerns are quickly defined and resolved assuring the very highest level of customer satisfaction and acceptance.





Personnel provides advice, counsel, and assistance to site management in the performance of their people-management responsibilities.

Personnel Relations

Personnel Research and Personnel Specialists constitute the Personnel Relations Project, a project which deals with such things as employee recognition, leadership/motivation, and appraisal and counseling.

Personnel Administration

A wide range of services are provided by Personnel Administration, including the maintenance of personnel records, benefits administration, and compensation.

Personnel Resources

The Personnel Resources Project includes the Employment, Placement and Equal Opportunity Programs departments. The project is involved in the employment and internal placement of employees. The Equal Opportunity Programs department administers the site's affirmative action plans.

Medical

The Medical Department provides the optimum in health care for employees through the prevention of disease and injuries, promotion of good health and safety practices, and restorative measures.



Resource Planning (Industrial Engineering) provides the planning and control of all key IBM resources at Raleigh. Activities include the following:

- **Space Planning**

Evaluates space requirements and provides the basic Industrial Engineering support to Manufacturing and Distribution. Special emphasis is placed upon productivity improvements through methods analysis, workplace and department layouts, and materials handling applications.

- **Manpower Planning**

Generates the direct (manufacturing personnel) and indirect (support personnel such as, Production Control, Finance, Personnel, Industrial Engineering, etc.) resource requirements for Manufacturing operating and strategic plans.

- **Manufacturing Planning**

Has responsibility for coordinating and consolidating the CPD Raleigh manufacturing plan and releasing it to CPD headquarters. Other activities include the coordination of product transfers and business case assessments for product sourcing.

- **Manufacturing Cost Engineering**

Establishes product cost projections for manufacturing operating plan and program cost estimates. Activities also include cost performance tracking and variance analysis as well as business case development to address product sourcing alternatives.

- **Cost Management/IE Systems**

Provides cost planning coordination and manufacturing early involvement in the product development process. IE Systems provides the internal, stand-alone computer systems capability for the processing of space, manpower, and cost data.

- **Procurement Estimating**

Develops concise cost estimates for procured parts. Involvement extends to vendor negotiations and value engineering.





Distribution

The Distribution Function is responsible for the physical logistics management of all goods consumed by the site and used in the manufacture of our products or administration of our operations. Distribution is divided into the following project areas:

- **Receiving**
- **Stockrooms**
- **Control**
- **Packaging/Shipping**
- **Operations/Planning**

These projects include the Traffic Operations and Administration Departments. These areas provide transportation services for inbound and outbound shipments. All carrier contracts are handled through this area.

Distribution Planning furnishes all staff and related project support to the entire Distribution Function. Responsibilities include resources, budgets, special projects, education and measurements. A user systems analyst group residing in this department provides liaison for systems problems and installation between Distribution and associated users.

Procurement

Procurement acquires all goods and services used at Raleigh. To insure that this acquisition is both timely and economical, there are four highly specialized areas in Procurement:

- **Production buying purchases vendor-made parts for our product line (about 50% of our parts are made off-site).**

- **Non-Production Buying acquires hard goods and services (such as maintenance parts and equipment).**
- **Administration handles the paperwork involved, including records.**
- **Contract Administration/ Plans and Controls prepares and maintains major purchase contracts (i.e., vending machines, building maintenance and non-IBM product purchases). This group also forecasts, measures, and analyzes purchases.**



Inventory Plans and Controls

PC Materials Systems and Controls provides staff support to Materials Management encompassing technical support for existing and future systems applications and procedures. Major systems applications include materials requirements and planning systems, materials logistics and release system, interplant order control and customer order processing systems.

Scheduling and Order Control plans for, schedules, receives and controls all product orders for the Raleigh site.

Inventory Planning and Control is responsible for providing site inventory levels using several forecasting techniques. Input/Output analyses, inventory turns, master schedules and cyclical trends are used to accomplish this goal.

Production Control

Production Control has the primary responsibility to plan and control those assemblies and components, which constitute the final product to be manufactured. Additionally this group oversees the availability and requirements of parts and field up-grade kits for Field Support and other IBM locations. These activities are performed by the following areas:

- Communications and Telecommunications Production Control have the specific responsibility to provide the pre-analysis of requirements to support the ordering, manufacture and delivery of components for the entire Raleigh product mission.
- Manufacturing Work In Process extends parts control into manufacturing. These controls are also extended into various vendor/supplier locations currently involved in IBM subcontract work.

MES Orders and Schedules Operations (Miscellaneous Equipment Specifications)

MES Orders and Schedules Operations has the overall responsibility for planning, scheduling, kitting, packaging and shipping of miscellaneous equipment specifications and field upgrade kits to machines resident at customer locations. Operational responsibilities for this mission are in two groups:

- Miscellaneous Equipment Specifications (MES)/Machine Level Control (MLC) Operations is responsible for order analysis and scheduling of all MES orders for the IBM Raleigh Plant. All field interface activities relating to order entry, delivery schedules



or expediting are coordinated through this area. Machine level control of all installed Raleigh machines is also maintained by MES/MLC Operations.

- Miscellaneous Equipment Specifications (MES)/Field Bills of Material (FBM) Field Service Operations is responsible for the assembly of parts and documentation that comprise MES and FBM upgrade kits. Additionally, this organization packages and ships MES and FBM kits to IBM field locations and customers. Resident in the FBM Administration group are the Site Field Logistics and Field Interface responsibilities.





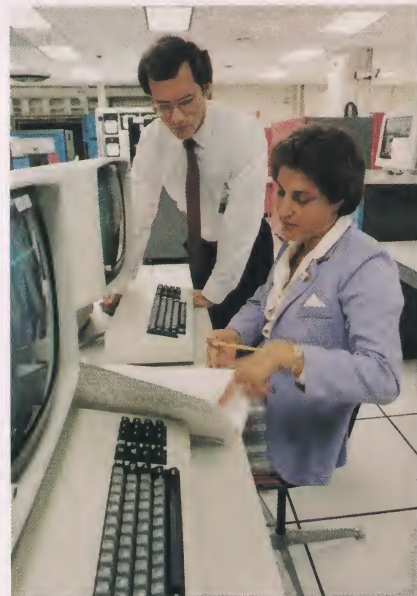
Communication Products Assurance is responsible for assuring that IBM hardware and program products developed in Raleigh are satisfactory to both IBM and its customers.

Assurance accomplishes this mission by appropriate testing and analyses during the development phases. Assurance provides continuous project and technical assessments to management prior to announcement and first customer shipment of each product.

Assurance laboratory facilities include a sound measurement chamber, environmental chambers for testing under temperature, humidity and altitude conditions, a vibration chamber and other specialized and standard electrical and data communications test equipment. Hardware and programming simulation are major testing methods.

The engineers and programmers of Assurance work directly with product planning, development, marketing, manufacturing and service organizations to ensure that IBM products meet their design specifications, corporate standards and customer requirements.

They assure appropriate test procedures are developed to cover product requirements in function, performance, stress, serviceability, human factors, reliability, and overall product quality. As IBM's "first and toughest customer," the engineers and programmers assure the total systems aspects of each product.





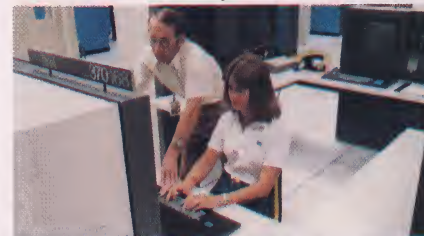
Product Support Services is the main interface between development and manufacturing. It is responsible for creating and communicating to manufacturing the necessary technical and administrative data supporting the ordering, building, testing, and shipping of all parts engineered and/or manufactured in RTP and/or the World Trade Corporation.

PSS personnel, through the use of computer-aided graphics, convert development engineering designs and ideas into properly structured electrical and technical data used by manufacturing to build a "product." These "products" include printed circuit cards/boards, chips, modules, and various hardware items.

PSS personnel are also responsible for generating, controlling, and making timely distribution of technical and administrative data. This data, transmitted to a network of world-wide manufacturing sites, enables proper customer order processing, early parts ordering, timely product shipments, and machine logistics control. PSS further fulfills its overall responsibility for maintaining an accurate computerized records database for IBM products and parts.

Product support services utilizes an interactive computer graphics system, CADAM[®], to accomplish much of its design activities. This state-of-the-art application allows

PSS a drawing area the size of forty-eight football fields while testing these designs using locally written applications programs. Stress/strain, center-of-gravity, 3-D graphics, and numerical control analysis can be done in seconds. Documentation created by this system is outputted to film, microfilms, or paper for use locally or in a digital file which can be transmitted to any other IBM site.





Plant Engineering plans, develops and designs, operates and maintains physical facilities in the support of manufacturing, laboratories, administrative, and warehouse operations.

This mission is accomplished through the following major subgroups:

- Facilities Engineering is responsible for new building programs and the major site facilities systems engineering and operation including environmental, energy, and chemical systems.
- Facilities Layout and Rearrangement Engineering is responsible for all indirect space planning, lease coordination and all rearrangement engineering to insure the most efficient use of the physical plant.
- Facilities Services provides maintenance engineering and repair services for the site. In addition, it maintains standards and calibrates electronic test equipment.
- Plant Services provides maintenance engineering and repair services for all production, process and materials handling equipment.





MIS provides the information systems hardware and software services needed to support our Research Triangle Park manufacturing complex. MIS is responsible for understanding the manufacturing environment and business needs, and for designing, testing, installing, maintaining and enhancing the application systems to meet those needs. To fulfill these responsibilities, MIS is organized into four distinct areas:

Systems Support: provides on-line teleprocessing and batch computing resources to support RTP-based manufacturing, programming, engineering, and administrative organizations. Activities include maintenance of operating systems for a 6-computer complex, data management, library control, performance tuning, three shift computer center operations, hardware change/installations, data entry and customer interface.

Material Logistics System: a programming area which supports a large scale on-line system controlling a highly automated Material Distribution Center. That system provides parts receiving-stocking-disbursing-costing functions and work-in-process inventory management, and is an integral part of the parts planning/ordering process. Support is also provided for engineering and manufacturing basic records—product structure, engineering change and manufacturing process data.

Product Logistics and General Systems: a programming area which supports the flow and control of customer machine orders, manufacturing line control, shipments and equipment returns. Systems are also provided to support site organizations such as administration, finance, personnel, procurement, traffic and facilities.

Business Plans and Controls: develops long-range systems strategies to support manufacturing. It insures that all new products worldwide can be supported by existing, new or modified systems and provides administrative, manufacturing and technical support for all products using microcode. It also provides business, hardware and software planning and tracking needed to manage MIS resources.





Product Development Support is responsible for:

- Providing information about IBM products to customers and service personnel (Information Development).
- Providing human factors guidance to all product development areas to ensure that the best "ease of use" designs are incorporated into each IBM product (Human Factors Engineering).

Raleigh Information Development

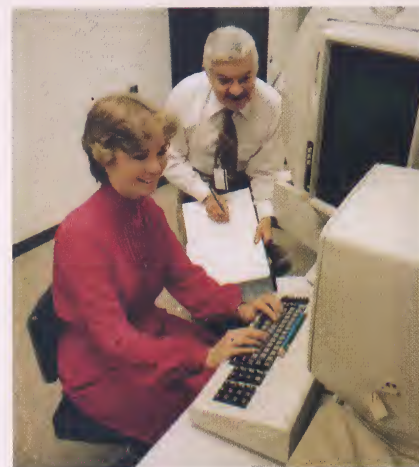
Raleigh Information Development plans, researches, writes and publishes two major types of manuals:

- Customer manuals that describe the setup, check-out, operation and application of a product.
- Maintenance manuals that describe the installation, maintenance and repair procedures of a product.

This work involves the combined efforts of information planners, technical writers, technical editors, and graphic artists who prepare finished drafts for testing, review, approval, and publishing. These people have the latest in text processing and graphics art equipment available to assist them in their work.

Raleigh Human Factors Engineering

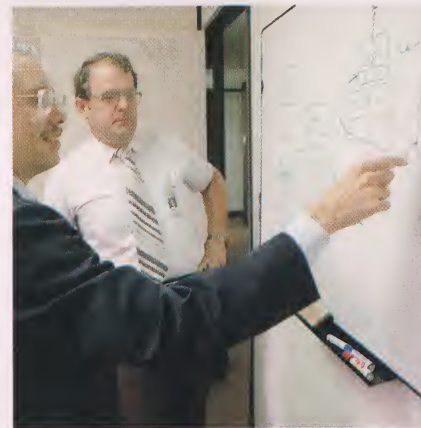
Easy to use products are an essential part of IBM's "commitment to quality". The human factors professional within IBM has a major role in this effort by representing the end-user during the development process. Human factors engineers work with a variety of new product areas within IBM including, hardware, software, maintenance methods and applied research.





Architecture and Telecommunications defines the framework that allows products to work effectively together. This framework, Systems Network Architecture (SNA), guides the world-wide development of IBM communications products. Architecture development requires an understanding of the customer's environment, public communications facilities, advances in communications software, standards, and government regulations affecting our products. With this knowledge, we are able to specify the architecture (procedures and formats) to allow exchange of information within a building or around the world.

Architects generally have strong computer science or engineering backgrounds, enhanced by expertise in the areas of networking, systems development, planning common-carrier services, and data transmission. They work closely with development and marketing groups across IBM to insure that our communications products will meet the needs of our customers now and in the future.





The mission of Component Engineering is to provide technical support for the Raleigh site relative to components. The emphasis is on problem solving and problem prevention for both the IBM Communications Products Development Lab and the Manufacturing Plant at RTP.

Typical components supported are:

- Communication Adapters/Modems
- Communication Cables
- Switches/Connectors
- Fiber Optics
- Lasers/Photodetectors
- Holograms
- CRTs and Displays
- Printers
- Motors
- Modules
- Electronic Assemblies
- Transformers
- Power Supplies
- Discrete Devices

To be more specific, Component Engineering provides consultation and technical leadership relative to the following topics.

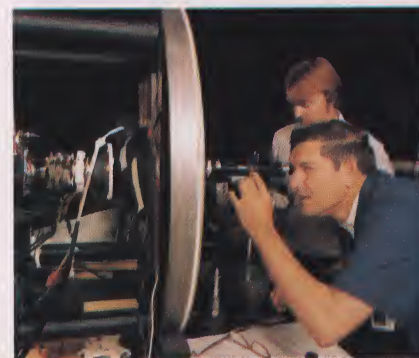
- Identifying or developing components to meet current and future communication product needs.

- Accurately specifying component requirements to ensure that application needs are satisfied.
- Verifying that a supplier can and will provide hardware per print and specification requirements.
- Verifying that available components do meet specifications.
- Identifying failure modes and expected life for the components.
- Establishing Quality Control procedures.
- Risk assessments relative to designs and technical issues.
- Automated collection and analysis of data.
- Life and environmental stress testing relative to temperature and humidity cycling, thermal shock, vibration and mechanical shock, corrosive gases, reliability, etc.

Component Engineers are problem solvers with an in-depth understanding of engineering principles and the ability to apply this knowledge to a wide variety of technologies and issues. Also needed is a general knowledge of failure analysis techniques, testing approaches and statistics. As such, they devote most of their time to resolving complex problems which typically can not be addressed by the average Product Development or Manufacturing

Engineer. Individuals typically have degrees in Mechanical Engineering, Electrical Engineering or Physics and are continuing to pursue advanced degrees under IBM's Graduate-Work Study Program.

From a product point of view, Component Engineering personnel are involved with all phases of the product cycle, including the initial conception of the product, its design, development, release and manufacture.





The mission of Radiation Engineering is to provide technical leadership and design support to the Raleigh site in the technology areas of acoustical noise control, electromagnetic compatibility, and heat transfer.

Acoustical noise control deals with the elimination and control of acoustical energy generated by data processing and communication products. Electromagnetic compatibility includes electromagnetic interference and electromagnetic susceptibility due to radio frequency noise, electrostatic discharge, lightning interference on communication lines, and transient noise on power lines. Heat transfer technology deals with thermodynamics, fluid dynamics, and the cooling of electronic devices and electronic packages.

Radiation Engineering provides technical consulting support to Development Engineering Groups, Product Assurance, and Quality Assurance in the above technology areas.

Design assistance, from the initial design concept of a new product to the completion of the final design, is provided to Development Engineering who is responsible for the development of new products. Activities include:

- definition of functional specifications
- specific design recommendations
- prototype hardware evaluations
- analytical design model studies
- field installation planning recommendations
- field problem solving

Radiation Engineering supports Product Assurance by performing verification tests to the product functional specification on new products prior to release of the design to Manufacturing and prior to first customer shipments of a new product. Solutions are also recommended when design deficiencies are discovered during the design verification test. Support is also provided to Quality Assurance to verify the performance of products after they are in production to insure that they are meeting their functional specifications.

Analytical modeling and measurement analysis techniques are used to define problems and solutions associated with new product development. Computer models are used to provide numerical solutions to problems in acoustical noise control, electromagnetic compatibility, and heat transfer. Modern test facilities and automated measurement equipment are used to evaluate and analyze problems and their solutions.

Technology projects are carried out in key technology areas to advance our knowledge and skills to meet future needs.





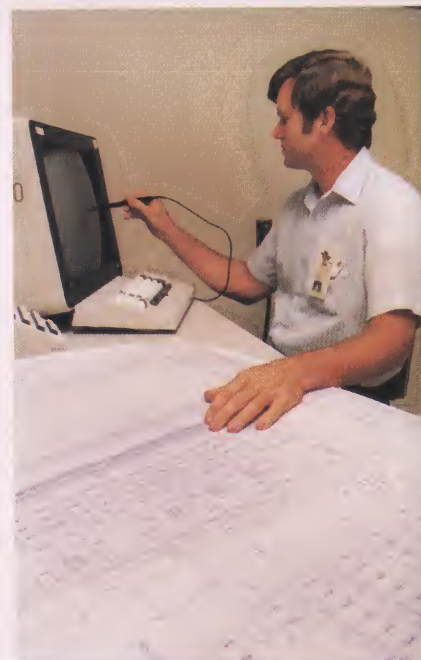
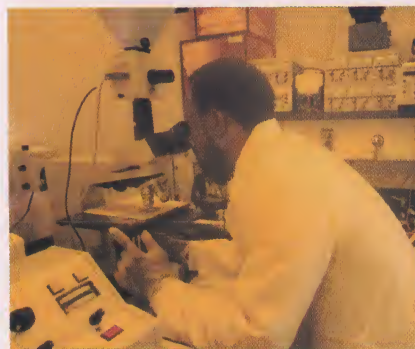
The mission of Logic and Circuit Technology is to provide product development groups with special electronic circuit design support and development activity.

Circuit design projects include a wide variety of circuit applications and configurations. Special integrated circuits are designed using either FET or Bipolar technologies. Technology development is focused on the future needs of the Raleigh developed products for special memory, logic, and signal processing integrated circuits and for low power displays. Future needs provides opportunity for developing innovative, unique circuits/devices.

Typical design activities include:

- low-noise, high-gain amplifiers for optical scanning
- high current motor drivers for printers
- special driver/receiver integrated circuits for communications products
- new technology device designs
- liquid crystal device development

Electrical engineers in this area develop a variety of special skills with most jobs requiring understanding of the electronic circuit technologies available and capabilities in circuit analysis and testing of laboratory prototypes.





The mission of Design Center is to operate as an extension of the IBM Corporation's Design Program, which has been established to achieve excellence in all visual expressions of IBM. It brings together professional industrial designers and graphic designers to project the image and character of the IBM Company in products and graphics.

High quality standards of product appearance and usability are developed by industrial designers for communication products being developed in Raleigh. The design of brochures, posters, pamphlets and exhibits are created by graphic designers serving the needs of IBM in the laboratory and manufacturing areas.





The mission of the Materials Lab is to provide services to all Development and Manufacturing areas in the fields of Materials Engineering, Mechanical Analysis and Electron Microscopy.

Typical activities include:

Selecting all materials used in products developed in RTP

- Performing materials evaluations for life and function for specific product applications
- Evaluating new materials
- Advancing the state-of-the-art in both materials and process technologies.
- Conducting failure analysis
- Scanning electron microscopy/microprobe analysis
- Light microscopy and metallography to determine failure mechanisms for metals, plastics and devices
- Chemical Analysis and Identification
- Infra-red spectroscopy
- Atomic absorption spectroscopy
- Differential scanning calorimetry
- Differential thermal analysis
- Ultra-violet spectroscopy
- Energy dispersive x-ray analysis

- Developing processes used in Raleigh products
- Preparing engineering specifications for RTP parts
- Mechanical Analysis
- Provide both analytical and experimental techniques to solve mechanical problems. These include finite element analysis, photoelastic stress analysis, vibration and kinematic analysis, and high speed photography

The Materials Laboratory is staffed with:

- Analytical Chemists
- Mechanical Engineers
- Metallurgists
- Plastics Engineers
- Polymer Scientists







IBM

**Communication Products Division
PO Box 12195
Research Triangle Park, NC 27709**

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